

XXX.—On the Corals of the Maltese Miocene.  
By P. MARTIN DUNCAN, M.B. Lond., Sec. Geol. Soc.

[Plate XI.]

THE Corals discovered in the strata in the island of Malta are generally badly preserved. Either they are found as casts or are so filled with a ferruginous mineral as to be indeterminable. The few which are well preserved offer some points of interest, and add to the palæontological data upon which the geological age of the whole series of strata is determined.

MM. Milne-Edwards and Jules Haime have described two species from the island, but have not mentioned the bed whence they were derived—the *Acanthocyathus Hastingsiæ*, Ed. & Haime, and the *Heliastrea Prevostana*, Ed. & Haime\*. The second species is founded on a badly preserved coral of the genus *Astræa* (now termed *Heliastrea* by those able zoophytologists); and its specific characters are not sufficiently given to be comprehended. But it is not amongst the collection about to be described.

Following Dr. Adams's † last classification of the Maltese strata, and arranging the Corals under their respective beds, the species are thus distributed:—

1. The Coralline Limestone (uppermost stratum).

*Astræa (Heliastrea) Ellisiana*, DeFrance. Other localities, Miocene of Dax, Turin, Crete, &c.

*Astræa (Heliastrea) Forbesi*, sp. nov. Allied to the Miocene *A. Barbadosensis*, nobis.

2. The Yellow Sand.

*Stephanophyllia imperialis*, Michelin. Astesan Tertiaries.

*Flabellum extensum*, Michelin. Miocene of Turin, Villeneuve-lez-Avignon, Antwerp.

*Cœnocyathus Adamsi*, sp. nov. Allied to recent species in the Mediterranean.

*Acanthocyathus Hastingsiæ*, Ed. & Haime. (?)

3. The Clay-bed.

*Stephanophyllia imperialis*, Michelin.

4. The Calcareous Sandstone.

*Cœnocyathus*, sp.

\* Hist. Nat. des Corall. vol. ii. pp. 22 & 478.

† See various papers by Drs. Wright and Adams on the Echinodermata of these strata in Quart. Journ. Geol. Soc., and by Prof. R. Jones and myself in Geol. Mag. No. 3, 1864.

## 5. The hard Cherty Limestone.

*Stylocœnia lobatorotundata*, Michelin, sp. Miocene of Rivalba, Turin, Verona, Antiguan chert.

*Dendrophyllia irregularis*, Blainville. Miocene of Dax.

*Porites incrustans*, DeFrance, sp. Miocene of Turin, Dax, Trinidad, San Domingo.

*Astræa* (*Heliastræa*), sp., in large casts. Clearly a Miocene form.

The specimens were sent to me by Dr. Leith Adams, having been marked with the number of the beds whence they were derived. Doubtless many other species will be found.

*Cœnocyathus Adamsi*, n. sp. Pl. XI. fig. 1.

A corallite broken off from the parent corallum presents an ovoid mark of fracture, which is larger than the cylindrical pedicel immediately above it. The corallite is tall, nearly straight, and cylindrico-conical. The calice is not quite circular, is very open, shallow, and characterized by the prominent transversely ridged columella. The wall is stout, is marked by faint costal projections for a short distance from the calice, but is, with these, covered by a finely granular epitheca, which is marked by some aborted buds. The septa in six systems of four cycles; the primary and secondary are equal, and extend to the columella, but the primary are the most exsert; the tertiary are larger than those of the fourth cycle. The laminae are stoutest at the wall, are arched, and some become wavy near the columella; they are marked by sparse rows of granules. The pali, which are on the primary and secondary septa, are very small and indistinct.

Height of corallite 1 inch; width of calice  $\frac{9}{10}$  inch.

This species is determined by the great development of the columella and the smallness of the pali; and it has but a very remote affinity with *C. costulatus*, Reuss (Oligocene). The recent species, which are all Mediterranean, are equally remote.

Locality, Bed 2 (Adams), Malta. Coll. Geol. Soc.

*Astræa* (*Heliastræa*) *Forbesi*, n. sp. Pl. XI. fig. 2.

The corallum is large, often covers a large space, and presents a very uneven calicular surface. The growth of the corallites appears to have been more or less intermittent in some specimens, where the cœnenchyma exists at certain heights alone. The corallites in the larger specimens are nearly parallel and nearly cylindrical, and they vary in size somewhat; usually they are close, but not crowded; and in certain spots on luxuriant specimens they are evidently separated by some cœnenchyma. The calices are circular in outline, are slightly and irregularly ele-

vated above the intercalicular spaces, and are well open. The wall is well developed; its calicular margin is blunt, and it is marked externally by fine and distinct costæ. The calicular fossa is not deep; but the shallow fossæ of worn specimens are deceptive. The septa, in six systems of three cycles, are very delicate, not crowded, thin, slightly exsert, dentate, and unequal; the primary (the largest) extend to the columella; they have a small paliform tooth, and they are slightly thicker at the wall than elsewhere (in many specimens, owing to the form of fossilization, they are stout and are largest at the columella and wall). The secondary septa are smaller than the primary, but larger than the tertiary; they are thinner, and do not reach the columella; the tertiary project from the wall, and now and then curve towards the secondary. All are perforated occasionally, and are very fragile and granular. The costæ are slightly inclined at the calice, faintly dentate, and subequal, there not being that difference between them which there is between the septa; on the wall they project as thin laminæ with an irregular margin, and usually touch those of other corallites. The columella is feebly developed, and, in some corallites, barely exists; but, as a rule, it is small, distinct, and projects at the bottom of the fossa: it is parietal. The endotheca is very scanty. The exotheca is sparsely developed. The cœnenchyma exists in some spots, and is cellular; but it is by no means strongly developed.

Height of corallites  $\frac{3}{10}$ — $\frac{5}{10}$  inch; width of calices  $\frac{1}{10}$ — $\frac{1}{8}$  inch.

This Coral presents several varieties.

Var. 1, with deeper calices than the type.

„ 2, with the primary costæ larger than those of the type.

„ 3, with smaller calices

„ 4, with wider-apart calices } than those of the type.

The calcareous fossilization of this species alters the appearance of many specimens; in general, all the hard textures are thicker than those of the type, consequently the septa, wall, and costæ are larger, moreover their details are worn off. The best specimens are often intermingled with portions containing casts; and when this is the case, the interspaces are solid; but the original sclerenchyma has been destroyed, leaving vacant spaces.

The species is more closely allied to *Astræa* (*Heliæstræa*) *Barbadensis*, nobis\*, and to *Astræa* (*Heliæstræa*) *annularis*, Ellis and Solander, sp., than to any others. The first is from the Barbadian marl; and the last is a recent species, probably from Oceania. The wide-apart calices and well-developed columella of *Astræa* (*Heliæstræa*) *Raulini*†, Ed. & Haime, form a specific

\* Duncan, "West Indian Fossil Corals," Quart. Journ. Geol. Soc. vol. xix.

† Milne-Edwards and Jules Haime, Hist. Nat. des Corall. vol. ii. p. 474.



distinction; and the new species cannot be the *Astræa* (*Heli-astræa*) *Prevostana*, Ed. & Haime\*, which only differs from *A. Raulini* by its closer calices, thicker walls, and less developed costæ. The columella is well developed in this last species, if it be like *A. Raulini*. MM. Milne-Edwards and J. Haime do not figure or positively describe their "unique échantillon" "en assez mauvais état."

Locality, Bed No. 1 (Adams), Malta. Coll. Geol. Soc.

#### EXPLANATION OF PLATE XI.

- Fig. 1.* *a*, corallite of *Cænocyathus Adamsi*; *b*, its calice, magnified 2 diameters.  
*Fig. 2.* *a*, corallum of *Heliastrea Forbesi*, natural size; *b*, usual appearance of badly preserved specimens; *c*, calices, natural size; *d*, calices, magnified 4 diameters; *e*, monstrous calice with seven systems, magnified 4 diameters; *f*, calice without a columella, magnified 4 diameters.

#### XXXI.—Description of a new Genus of Amphipod Crustacea.

By Dr. FRITZ MÜLLER.

[Plate X.]

*BATEA*, nov. gen.

Antennæ simple. Coxæ of the first pair of gnathopoda rudimentary, those of the second pair of gnathopoda and the first two pairs of pereopoda largely developed. Coxæ of the second pair of pereopoda deeply excavated upon the upper part of the posterior margin. First pair of gnathopoda rudimentary, consisting of coxa and basis only; second pair of gnathopoda subchelate. Mandibles having an articulated appendage. Maxillipeds having a squamiform plate on both the basis and ischium joints. Fourth and fifth pairs of pleopoda with styliiform rami, sixth pair with subfoliaceous rami. Telson single, deeply cleft.

Species *Batea catharinensis*, F. M.

I will here add some remarks on the sexual differences of this interesting species. The pereion is somewhat longer and higher in the female; the antennæ of the same are shorter. The first joint of the peduncle of the upper antennæ has three, the second four, fasciculi of hairs on the inferior side in the male; they are wanting in the female. The long setæ at the extremity of the alternate articles of the flagellum of the first antennæ are directed downwards in the female, backwards in the male. The third and fourth joints of the peduncle of the lower antennæ have fasciculi

\* *Op. cit.* vol. ii. p. 475.